

Israel

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Israel neither confirms nor denies the existence of its nuclear programme¹ and factual information about it relies mainly on sources outside of Israel. Figures and estimates are based on the assumed power capacity of the Dimona nuclear reactor, the pictures and revelations from Mordechai Vanunu² (a former Dimona nuclear technician), recent satellite images³ and publications regarding the purchases of aircraft, submarines, and missile systems, which can be used as means of delivery.

Since the late 1960s, Israeli governments have maintained a policy of ambiguity and opacity about the nuclear programme in their various conversations with the United States government.⁴ The main phrase used then (and since) was that Israel won't be the first to "introduce" nuclear weapons to the Middle East. While the word "introduce" is usually considered to mean an Israeli nuclear test, the actual meaning still remains unclear as will be demonstrated in the section of this chapter on public discourse.

Since the *New York Times* publication in 1970, which featured revelations about the Israeli nuclear programme as based on US intelligence assumptions, it has been widely assumed that Israel possesses nuclear weapons.⁵

Current status

Nuclear weapons

Estimates about the size of the arsenal are based on the power capacity of the nuclear reactor near Dimona, ranging from 26MWt to 70MWt⁶ or even 150MWt,⁷ and on assumptions about production that in turn are based on speculation, scientific calculations, and unconfirmed revelations dating back to 1986.⁸

Experts and analysts outside of Israel estimate that Israel's current nuclear force ranges from 60–80 weapons, at the low end, to over 400 at the high end. The most recently cited figure is 90⁹ warheads, after a long period of an estimation of 80 warheads.¹⁰

Delivery systems

Israel has been developing its weapon delivery systems since the 1960s and is believed to have a nuclear triad made up of its Dolphin submarines, modified aircraft, and nuclear-tipped Jericho missiles.



Israel's missile programme is shrouded by a high level of secrecy and Israel does not release missile inventories. However, assumptions about its Jericho-II missiles are made, among others, based on Israel's space-launch rocket, the Shavit, which is similar to the Jericho-II.

Missiles

Sdot Micha Air Force Base is believed to host nuclear-tipped missiles¹¹ and it is assumed that Israel has deployed between 50 to 100 ballistic missiles:¹² the Jericho-I (out of commission), Jericho-II (1,500km

range), and Jericho-III (4,800km-6,500km range and 1,000-1,300kg payload),¹³ all capable of carrying nuclear warheads.¹⁴

A test launch, conducted in December 2019¹⁵ led to the assumption that it might be a Jericho 4 missile with a range of "thousands of kilometers and able to carry among others, nuclear warheads."¹⁶ Iran's Foreign Minister, Mohammed Javad Zarif, referred to the test on Twitter, saying that "Israel today tested a nuke-missile, aimed at Iran."¹⁷ Lack of any other news or information might mean that the test was to improve Jericho 3, rather than a new missile.

Table 1: Design characteristics of Israel's ballistic missiles

| | OTHER NAME | LENGTH (M) | DIAMETER (M) | PAYLOAD (KG) | RANGE (KM) | ACCURACY CEP (M) | PROPELIANT | STATUS |
|---------------|------------|------------|--------------|--------------|-------------|------------------|------------|----------------|
| Jericho-1 (1) | YA-1 | 13.40 | 0.8 | 450 | 500 | 1,000 | Solid | Obsolete |
| Jericho-2 (2) | YA-3 | 14.0 | 1.56 | 1,000 | 1,500-3,500 | n/k | Solid | Deployed |
| Jericho-3 (3) | YA-4 | 15.5 | 1.56 | 750 | 4,800-6,500 | n/k | Soild | Development |
| LORA (4) | | 5.2 | 0.62 | 440-600 | 200 | 10 | Solid | Deployed |
| EXTRA (5) | | 4.0 | n/k | 120 | 150 | 10 | Solid | Developments |
| Lance (6) | MGM-52 | 6.41 | 0.56 | 100 | 130 | 150 | Liquid | Decommissioned |

Source: Nuclear Threat Initiative, May 2012.

Aircraft

Even though Israel assured the US administration back in the late 1960s that it "agrees not to use any aircraft supplied by the US as a nuclear weapons carrier,"¹⁸ it is believed that some of the Israeli Air Force Fleet has been modified to carry nuclear weapons.

Since the 1980s, Israel's estimated 200 F-16 Falcons, with a range of 2500km, have been the backbone of the Israeli Air Force (IAF), alongside a fleet of F-15 Eagles (Boeing). Both of these planes are used by the US and the North Atlantic Treaty Organisation (NATO) for carrying nuclear weapons. At the end of 2017, the new Lockheed-Martin F-35I came into operation in Israel and has already been used to attack Iranian targets in Syria.¹⁹ Despite a number of reservations by Israeli officials,²⁰ Israel has committed to a further purchase of the aircraft, bringing the total size of its future fleet to 33 in number. The F-35I, which is supposed to replace the older F-16s, is reportedly used by the US for nuclear weapon missions, although there is no indication that Israel will do the same, nor is there any evidence that Israel has made any promises to the US administration regarding any future use.

Submarines

As of January 2016, Israel's fleet includes five Dolphin-class submarines built in Germany.²¹ One more submarine should become operational by the end of 2023²² and will bring the fleet to a total of six.²³ Estimates²⁴ are that at least some of the submarines have been modified and used for nuclear missions, and even the Israeli press refers to the fleet as Israel's "second strike".²⁵

From numerous estimates and articles trying to guess which of the cruise missiles believed to be on board the Israeli submarines are nuclear capable, there are three main options:²⁶

- Popeye Turbo, an Israeli air to surface missile, with a payload of 350 kg and an estimated range of 1,500km;²⁷
- Harpoon, a US anti-ship cruise missile, with a payload of 224kg and a range of 90 – 240km;²⁸ or
- Gabriel Mk4-5, an Israeli short-range anti-ship cruise missile, with a payload of about 240kg and an estimated range of 200–400km.²⁹

It would be a calculated guess to assume that the Popeye Turbo missile is the best candidate for Israel's second strike capability, based on the following a) no other country has modified its Harpoon missiles for nuclear

usage;³⁰ b) the range of the Popeye missile and its payload; and c) there is an assumption that the Dolphin's nuclear delivery systems have been developed in Israel.³¹

Table 2

| NAME (NUMBER) | CLASS | BUILDER | COMMISSIONED |
|---------------|------------|---------|--------------|
| INS Dolphin | Dolphin | HDW | 1999 |
| IMS Leviathan | Dolphin | HDW | 2000 |
| INS Tekumah | Dolphin | HDW | 2000 |
| INS Tanin | Dolphin II | HDW | 2014 |
| INS Rahav | Dolphin II | HDW | 2016 |

Source: Nuclear Threat Initiative, 16 Oct 2019.

Fissile materials

It is estimated³² that Israel could have produced approximately 840 kg of weapons-grade plutonium.³³ Estimates of highly enriched uranium (HEU) production are even more difficult to make. According to the International Panel on Fissile Materials (IPFM), Israel is believed to not have any significant domestic HEU production for weapons, yet may have acquired a small HEU stockpile.³⁴ A recent estimate has assumed Israel possesses approximately 300 kg of HEU.³⁵

Infrastructure

There are two main nuclear facilities in Israel.

In operation since the 1960s, the Shimon Peres Negev Nuclear Research Center (NNRC), located near Dimona, is believed to be the oldest heavy water reactor still working today, although it is believed that, if it is still operational, it is mainly for tritium production.³⁶

When built in the Negev desert near the city of Dimona, with the assistance of France, the reactor's capacity was 24 MWt, and now it is believed to be between 40–70 MWt³⁷ or even 150 MWt.³⁸

According to the Israel Atomic Energy Commission (IAEC), the NNRC's main purpose is to "broaden basic knowledge in nuclear sciences and adjacent fields and to provide the foundation for the practical and economic utilization of nuclear energy."³⁹ The facility hosts Israel's research and production of radioactive isotopes for medical use, an educational programme,

and is responsible for Israel's radioactive waste.⁴⁰ However, reports based on statements by Mordechai Vanunu, among others, suggest further activities such as plutonium extraction, plutonium reprocessing, production of tritium and lithium-6, uranium processing, enrichment, and fuel fabrication.⁴¹ The NNRC is not under International Atomic Energy Agency (IAEA) safeguards.

The pool-type light water reactor for the Soreq Nuclear Research Center (SNRC) was donated by the United States and built in the 1950s as part of the Atoms for Peace programme. It became operational in 1960.⁴² Originally the reactor's capacity was 1MWt and later on expanded to 5MWt. The SNRC is located approximately 40km south of Tel Aviv near the city of Yavne and is the only facility in Israel under IAEA safeguards.

According to the Soreq website, "Today the SNRC is an established research center founded on scientific and technological excellence in a range of areas including nuclear physics and engineering, nuclear medicine, non-destructive testing techniques, laser and optronic applications, testing components and materials in space environment, radiation safety, and more."⁴³

In 2012 there were reports⁴⁴ that the IAEC was planning to close the reactor in order to focus on its particle accelerator and even suggestions⁴⁵ that Israel has shipped 102 spent uranium rods to the US.

The Israeli Atomic Energy Commission (IAEC) oversees Israel's nuclear activities.⁴⁶ Responsibility for the IAEC falls under the prime minister's office and it reports directly to him, as the chair of the IAEC.

Although the IAEA was created in 1952,⁴⁷ its roles and methods of monitoring its activities have never been enshrined in law.⁴⁸ Instead they were established by a secret administrative order, issued by then-prime minister David Ben Gurion and later via a series of secret government rulings.⁴⁹ In addition, the IAEA's facilities are excluded from relevant legislation, such as that concerning the treatment of hazardous materials,⁵⁰ non-ionising radiation,⁵¹ and the pharmaceutical applications of radioactive materials.⁵² These rulings specifically mention that the law doesn't apply to the IAEA's facilities. The Commission deals with a variety of topics concerning health and safety, including nuclear safety, the licensing of facilities and activities, and the treatment of nuclear waste, and serves as a governmental consultant as well as represents Israel in relevant international organisations.

Economics

When trying to estimate Israel's annual spending on its nuclear capabilities, one has to rely on scarce information. The Stockholm International Peace Research Institute (SIPRI) estimates Israel's total military spending for 2018 at US \$15.88 billion.⁵³ If we combine this information with a 2011 report from Global Zero report⁵⁴ which estimated that 11.53 per cent of Israeli military spending is allocated to nuclear weapons, we arrive at an estimate of US \$1.839 billion for 2018. However, the IAEA budget is under the budget of the Office of the Prime Minister, and Israel military spending remains ambiguous and difficult to understand, organised across a variety of budget lines and items.

International law and doctrine

Israel is not a state party to any of the major arms control related treaties and therefore, argues that it is not bound by them. Though the policy of ambiguity has shaped Israel's behaviour in the international arena, other factors include the fear or resentment of being "singled out," along with a long history of suspicion that "the world" is against Israel.⁵⁵ On the other side is Israel's expectation to be treated differently from other states, based on it having been the safe haven for Jews after the Holocaust—but a safe haven surrounded by enemy states that do not recognise Israel's right to exist. At the same time, Israeli officials, in international fora talk about Israel's "long standing policy to bring itself closer, wherever possible, to international norms on nuclear safety, security and non-proliferation."⁵⁶

While Israel resists calls to disarm and join the nuclear Non-Proliferation Treaty (NPT), it is a member state of the Treaty's "watchdog"—the International Atomic

Energy Agency (IAEA)—since 1957⁵⁷ and "has played a positive role in some of the activities related to the non-proliferation regime, such as in its positive working relations with the IAEA in the area of nuclear safety, and in the creation and operations of the Comprehensive Test Ban Treaty (CTBT) mechanism."⁵⁸

As part of its "positive role," Israel has signed the Convention on Nuclear Safety and the Vienna Convention on Civil Liability for Nuclear Damage. It has also ratified the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency; the Convention on Early Notification of a Nuclear Accident; the Amendment to the Convention on the Physical Protection of Nuclear Material; and the Convention on the Physical Protection of Nuclear Material.⁵⁹

An example of Israel's desire to be recognised as a contributing and technologically advanced member of the IAEA was demonstrated by a statement delivered by Dr. Shaul Chorev, the then-head of the IAEA (2007–2015) at the 56th General Conference of the IAEA in September 2012. After a long statement regarding Iran and the Arab states' call for a weapons of mass destruction free zone in the Middle East, Chorev reported on Israeli participation in the Nuclear Security Summit in the Republic of Korea, announced Israel's "modest contribution"⁶⁰ to the IAEA project of enhancing the Capabilities of the Safeguards Analytical Service, and the launch of a project "for improving Quality Assurance in Nuclear Medicine". Despite "unwelcoming circumstances in the Middle East," Chorev also invited all states in the region to an Israeli-hosted workshop for the Asia Pacific Region, so that Israel could share its experience in the application of radiotherapy for cancer treatment. At the end of his statement, Chorev recalled that the IAEA is invited to Israel to conduct an Integrated Safety Assessment of the IRR-1 at the Soreq Nuclear Research Center, in addition to biannual inspections by the IAEA.

Israel has signed but not ratified the CTBT, which was adopted in 1996, and hosts CTBT Organisation (CTBTO) monitoring stations, including a seismic and radionuclide laboratory.⁶¹ Though supportive of the CTBT, Israel has been reluctant to ratify it.

On 21 June 2016, in a first-time meeting between a head of the CTBTO and an Israeli prime minister (now former), Netanyahu repeated Israel's support for the Treaty, but said that ratification "depends on the regional context and the appropriate timing."

In an interview conducted by an Israeli newspaper in 2019, Lassina Zerbo, head of the CTBTO, told the reporter that "Israel will likely agree to ban nuclear testing within the next three years."⁶²

Israel abstained from participating in all humanitarian conferences preceding to the negotiations towards the Treaty on the Prohibition of Nuclear Weapons (TPNW).⁶³ In 2016, Israel voted against the UN General Assembly resolution that established the formal mandate for states to commence the negotiations in 2017 on “a legally binding instrument to prohibit nuclear weapons, leading towards their total elimination”.⁶⁴ In 2019, Israel voted against a UN General Assembly resolution that welcomed the adoption of the treaty.⁶⁵

Weapons of mass destruction free zone in the Middle East

Banning nuclear weapons in the Middle East has been linked to broader regional security issues and the eventual banning of all weapons of mass destruction. Israel, seen as the sole nuclear weapon state in the region, first insists on discussing security and regional recognition before engaging in talks on disarmament. Conversely, Arab states want an agreement on disarmament prior to discussions on security. This procedural and sequencing disagreement adds to a long list of other regional security-related challenges that have stifled cooperation and solution-based approaches.

A weapons of mass destruction free zone (WMDFZ) was first proposed by Egypt in 1990 with backing from Iran. In 1995, the NPT Review and Extension Conference resulted in the indefinite extension of the NPT, with a specific resolution co-sponsored by Russia, the United Kingdom, and the United States calling for the establishment of a WMDFZ in the Middle East. This resolution linked the indefinite extension of the NPT to commitments to create such a zone.⁶⁶

At the 2010 NPT Review Conference, states parties agreed to practical steps to progress toward establishing the WMDFZ by convening a conference on the zone by 2012 and appointing Finland’s Ambassador Jaakko Laajava as facilitator. In November 2012, however, the conference was called off by the United States “because of present conditions in the Middle East and the fact that states in the region have not reached agreement on acceptable conditions for a conference.”⁶⁷ Similarly, at the 2015 NPT Review Conference, calls to restart the talks on a WMDFZ conference were derailed by the United States, the United Kingdom, and Canada.

Since Israel is a non-signatory to the NPT, it has no obligation to attend the conference on the zone within the NPT framework. That is one reason that led to the adoption by the UN General Assembly (UNGA) First Committee a resolution in 2018, submitted by the Arab states, requesting the UN Secretary-General to convene

a regional conference on the zone by the end of 2019. This time around, the conference would be outside of the NPT process, and therefore, Israel might be more inclined to participate.

The first conference on the zone was convened at the UN Headquarters in New York, presided over by the Jordanian UN Ambassador Sima Bahous with facilitation by the UN Office of Disarmament Affairs (UNODA) from 18–22 November 2019.⁶⁸ The second session of the Conference, scheduled for November 2020, was postponed due to the COVID-19 pandemic and instead was held from 29 November to 3 December 2021 under the presidency of Kuwait, Ambassador Mansour Al-Otaibi.⁶⁹ To the surprise of naysayers, participation in the first conference was robust, with the presence of all twenty-two-member states of the Arab League, Iran, four nuclear-armed states (China, France, Russia, and the United Kingdom), relevant international institutions, and a handful of civil society organisations.⁷⁰ The only states missing in the room among those invited were Israel and the United States, who remain attached to their insistence that the region is either not “ready” to discuss the zone or that this initiative is simply anti-Israeli. One key feature of the conference proceedings, though, is that all decisions were made based on consensus. Therefore, Israel’s participation in the conference would enable its views to be aired and considered while having nothing to lose by virtue of the consensus-based decision-making process. This watershed conference, therefore, presented an opportunity for all regional states to discuss, in good faith, the path forward toward the zone and, through it, the broader geopolitical challenges facing the region.⁷¹

The second conference, which took place in 2021, also ended on a hopeful note. The final report⁷² was adopted by consensus on the last day of the conference. The key features of the report include agreement on the Rules of Procedure, thematic areas, and continuing the discussion through intersessional meetings. The decision of states to establish a Working Committee to continue deliberations during the Intersessional Period of the Conference is an encouragement for civil society to continue their work, despite not being able to physically access the meetings in New York due to the COVID-19 pandemic.⁷³

Ambiguity

The birth of ambiguity as a policy is rooted in several factors: the special relationship between Israel and the United States, the advancement of the already secretive⁷⁴ Israeli nuclear programme, and the negotiation and adoption of the NPT in these years.⁷⁵ As Merav Datan explained in this publication in 2015:

In 1969 Israeli Prime Minister Golda Meir and US President Richard Nixon reached a secret agreement that laid the foundation for a tacit “don’t ask, don’t tell” policy between the two states with respect to Israel’s nuclear-weapons capability. The US accepted that Israel felt a security-based need to have a nuclear-weapons capability, and Israel agreed not to undermine the NPT by openly declaring its nuclear capability. The secrecy surrounding Israel’s nuclear programme is an outgrowth of this compromise.⁷⁶

Israeli officials have always said that Israel “will not be the first to introduce nuclear weapons to the Middle East” ever since the 1960s and still do so today, such as in a more recent CNN interview with Israeli Prime Minister Netanyahu.⁷⁷ Presidents, state secretaries, experts, and diplomats have since the 1960s until the present day tried to guess if “introduction” means a nuclear test, the possession of nuclear weapons, their deployment, or an announcement.⁷⁸

While Israel is considered by the rest of the world to be one of nine states possessing nuclear weapons, ambiguity plays a major role in Israel’s international relationships and participation in international nuclear-related fora, and even a bigger role in the internal discourse within the state of Israel.

Public discourse

While ambiguity outside Israel mainly covers the question of possession, the ambiguity inside Israel has a different magnitude. There is some limited discussion in academic circles amongst a small group of academics and think tanks, usually comprised of those who used to be part of the security system, and a steadily growing number of discussions in the media, though the focus is usually on Iran’s nuclear programme and not Israel’s.

The vast majority of Israelis, including the media, parliament,⁷⁹ and civil society organisations, are sure that the main reason for ambiguity is security confidentiality. In a way, keeping the secret even from Israelis has become sacred.⁸⁰ The fear for Israel’s existence, the fear of Israeli isolation, the shared memory of the Holocaust,

alongside questions still being posed about whether Israel has the right to exist or be recognised, make it harder to maintain an open discourse. With Israel’s long history of self-censorship⁸¹ and a reliance on foreign sources, the discourse is extremely limited and ill-informed.⁸² Furthermore, there is no discussion on the existence of the facilities or structures that develop and maintain Israel’s arsenal and, therefore, no public discussion regarding the actions or liability of the IAEA.

In fact, there is a common belief among the Israeli public and most members of the media that it is prohibited to even discuss this matter. This secrecy not only covers the question of Israel’s arsenal, but also extends to the security of the reactors, radioactive waste, nuclear energy, and even the question of whether Israel should possess such weapons. There is a general sense of fear that asking questions on this matter will raise doubts regarding loyalties and portray individuals, including members of the media and public officials, as traitors and irresponsible. This kind of taboo⁸³ also prevents a more responsible discussion on the meaning of nuclear weapon possession; related news from international fora (unless about Iran); the fact that the “world” treats Israel as a possessor of nuclear weapons; and even more importantly, how Israel effectively “deter” while keeping its capabilities secret.

On 29 August 2018, Prime Minister Binyamin Netanyahu stood outside the Dimona reactor⁸⁴ during a ceremony to rename the nuclear research facility after former president Shimon Peres, also known as the father of Israel’s nuclear programme.⁸⁵ He said to the media that any country that threatens to destroy Israel risks meeting a similar fate.⁸⁶ This kind of direct threat, along with reports on missile tests⁸⁷ and “slips of the tongue” by Israeli officials,⁸⁸ are seen outside of Israel as nuclear threats and as “maintaining deterrence,” but all this seems to be unseen or less understood by the Israeli media and, as a result, by the Israeli public.

The change in the discourse in Israel since the last election, is a minor one. While there are voices now claiming that Israel shouldn’t have pushed for the US to withdraw from the last agreements, there are hardly any voices supporting any new deal with Iran.

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